

CLAIMS

1. A measuring system for calibrating a machine, the measuring system comprising:
- 5 a base attachable to a surface of the machine;
a housing mountable on the base;
wherein at least one surface of the base and at least one surface of the housing are each provided with a complementary part of a mounting device, such that
- 10 when the two parts of the mounting device are connected together, the housing may be aligned in any of a plurality of predetermined directions.
2. A measuring system for calibrating a machine according to claim 1, the measuring system having at
- 15 least two housings, comprising:
- a base attachable to a first surface of the machine on which a first housing may be mounted;
a second housing attachable to a second surface on
- 20 the machine, said first and second surfaces of the machine being moveable relative to one another;
said first and second housings each being provided with a complementary part of a first mounting device, such that when the two parts of the first mounting
- 25 device are connected together, the housings are mutually aligned;
- wherein at least one surface of the base and at least one surface of the first housing are each provided with a complementary part of a second mounting
- 30 device, such that when the two parts of the second mounting device are connected together, the first and second housings may be aligned in any of a plurality of predetermined directions.

3. A measuring system for a machine according to any of claims 1 or 2 wherein the complementary parts of the second mounting device comprises a set of cooperating elements on the base and the first housing and wherein
5 a subset of cooperating elements used to align the first housing in a first direction also form a subset of cooperating elements used to align the first housing in a second direction.

10 4. A measuring system for a machine according to any preceding claim which the second housing is mounted onto the second surface of the machine via a connecting device and wherein a plurality of surfaces on the
15 connecting device are each provided with a complementary part of a third mounting device, such that the second housing may be attached to the connecting device when orientated in any of the plurality of predetermined directions.

20 5. A measuring system according to claim 4 in which the complementary parts of the third mounting device are arranged such that once the first and second housings have been aligned using the first mounting
25 device, and the first housing and base have been aligned using the second mounting device, the second housing and the connecting device may be connected without realignment of the first and second housing relative to one another being required.

30 6. A measuring system according to any of claims 4 or 5 in which the geometric combination of the first and second housings and the connecting device is such that the axes along which the first and second housings may

be aligned intercept at a common point.

7. A measuring system according to claim 6 in which the geometric combination of the first and second housings is such that the housing mounted on a moving part of the machine starts in the same position in X,Y,Z, whatever the orientation of the first and second housings.

8. A measuring system according to claim 6 in which the geometric combination of the first and second housings is such that the housing mounted on a moving part of the machine is moved through the interception of the axes, whatever the orientation of the first and second housings.

9. A measuring system according to any preceding ~~claim wherein a cable leads to the first housing and~~ wherein the cable is provided with a cable mounting device, wherein at least one surface on the cable mounting device and a plurality of surfaces on the base are each provided with complementary parts of a fourth mounting device such that the cable mounting device may be mounted on the base at different locations such that at each orientation of the first housing, the cable transmits an equal force on the housing.

10. A measuring system according to claim 9 wherein the cable mounting device is provided with a plurality of angled faces, wherein two or more faces of the cable mounting device are provided with said complementary part of the fourth mounting device, such that different faces of the cable mounting device may be attached to the base for different orientations of the first

housing, such that the cable transmits an equal force on the housing for each orientation of the housing.

11. A measuring system according to any preceding
5 claim in which the angle of the base is adjustable.

12. A platform for supporting a housing, the housing and platform being provided with complementary parts of a mounting device which define the position of the
10 housing when mounted on the platform, comprising:

a fixed surface of the platform on which the housing may be supported and on which part of said mounting device is located;

a lifting mechanism moveable between upper and
15 lower positions relative to said fixed surface;

whereby in its lower position, the lifting mechanism allows the complementary parts of the mounting device of the housing and the fixed surface to be in contact with one another and in its upper
20 position, the lifting mechanism causes the complementary parts of the mounting device of the housing and the fixed surface to at least partly break contact with one another.

25 13. A platform according to claim 12 wherein the lifting mechanism comprises a movable surface of the platform which may be raised and lowered;

whereby when the housing is placed on the moveable surface of the platform, the moveable surface may be
30 lowered to place the housing onto the fixed surface such that the complementary parts of the mounting device are connected or raised to disconnect the complementary parts of the mounting device.

14. A platform according to claim 13 wherein the movable surface and the housing are provided with complementary parts of a second mounting device such that the complementary parts of the first mounting
5 device on the housing and first surface are thereby pre-aligned.

15. A platform according to any of claims 12 to 14 wherein rotation of the movable surface in a first
10 direction causes said movable surface to be raised and wherein rotation of the movable surface in a second opposite direction causes said movable surface to be lowered.

15 16. A platform according to any of claims 12 to 14 wherein the movable surface is mounted on parallel springs whereby rotation of a cam raises or lowers the springs and thus the movable surface.

20 17. Apparatus for adjusting the angle of an object about an axis mounted on a surface comprising:
an upper plate onto which the object is mounted and a lower plate which in turn is mounted onto the surface;
25 a track located on the inner surface of one of the upper and lower plates;
a ball located between the upper and lower plates, the ball being in contact with the at least one track in the upper or lower plates;
30 wherein the track is arranged such that when the ball is moved in a first direction, the ball is raised and causes the plates to move apart and wherein when the ball is moved in a second opposite direction, the ball is lowered and causes the plates to move together.

18. Apparatus for adjusting the angle of an object according to claim 17 wherein the track comprises a pair of non-parallel rollers.

5 19. Apparatus for adjusting the angle of an object according to claim 17 wherein the track comprises a pair of parallel rollers which are positioned at an angle from the plane of the upper or lower plate in which they are located.

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20. Apparatus for adjusting the angle of an object according to claim 17 wherein the track comprises a pair of rollers and wherein each roller in the pair of rollers is tapered.

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21. Apparatus for adjusting the angle of an object according to any of claim 17-20 wherein the other of the upper and lower plates is provided with at least one element which is in contact with the ball.

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22. Apparatus for adjusting the angle of an object according to claim 21 wherein the at least one element comprises a pair of parallel rollers.

25 23. Apparatus for adjusting the angle of an object according to claim 21 wherein the at least one element comprises a plane surface.

24. Apparatus for adjusting the angle of an object
30 according to claim 21 wherein one of the at least one element and the track in the upper plate is part of a mount for the object and the other of the track and the at least one element of the lower plate is part of a mount for the surface, thereby forming a direct path

from the object to the surface through the tracks, balls and elements.

25. Apparatus for adjusting the angle of an object
5 according to any of claims 17-24 wherein several sets of balls and tracks are provided so that the angle of the upper plate may be adjusted about several axes.

26. Apparatus for adjusting the angle of an object
10 according to any of claims 17-25 wherein a track and ball is provided between adjacent substantially vertical surfaces of the upper and lower plates such that the upper plate may be rotated about the axis perpendicular to the plane of the lower plate.

15 27. Apparatus for adjusting the angle of an object according to claim 26 wherein the apparatus is provided with at least two tracks and balls to adjust the angle of the upper plate relative to the plane of the lower
20 plate and one track and ball to adjust the angle of the upper plate about the axis perpendicular to the plane of the lower plate, wherein the tracks used to adjust the angle of the upper plate relative to the plane of the lower plate are located in the lower plate so that
25 during rotation of the upper plate, the elements in the upper plate may slide or rotate over the balls and thereby allow the upper plate to be rotated independently of the adjustment of the angle of the upper plate relative to the plane of the lower plate.

30 28. Apparatus for adjusting the angle of an object according to claim 25 wherein two sets of tracks and rollers and a pivot may be provided to allow adjustment of the angle of the upper plate relative to the plane

of the lower plate.

29. Apparatus for adjusting the angle of an object according to claim 28 wherein a third set of tracks and
5 rollers is provided to provide rotation of the upper plate about an axis perpendicular to the plane of the lower plate.

30. Apparatus for adjusting the angle of an object
10 according to claim 25 wherein three sets of tracks and rollers may be provided to allow adjustment of the angle of the upper plate relative to the plane of the lower plate and in addition allow adjustment of the height of the upper plate relative to the lower plate.

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31. Apparatus for adjusting the angle of an object according to claim 30 wherein a fourth set of tracks and rollers is provided to provide rotation of the upper plate about an axis perpendicular to the plane of
20 the lower plate.